

INTERNATIONAL COOPERATION TREATY

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

| | | |
|--|---|--|
| Applicant's or agent's file reference CTV/P45134WO | FOR FURTHER ACTION see Notification of Transmittal of International Search Report (Form PCT/ISA/220) as well as, where applicable, item 5 below. | |
| International application No. PCT/GB 00/ 00526 | International filing date (day/month/year) 17/02/2000 | (Earliest) Priority Date (day/month/year) 17/02/1999 |
| Applicant UNIVERSITY OF NEWCASTLE et al. | | |

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 3 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. Basis of the report

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



the international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).

- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international search was carried out on the basis of the sequence listing :



contained in the international application in written form.



filed together with the international application in computer readable form.



furnished subsequently to this Authority in written form.



furnished subsequently to this Authority in computer readable form.



the statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.



the statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished

2. ☐ **Certain claims were found unsearchable** (See Box I).

3. ☐ **Unity of Invention is lacking** (see Box II).

4. With regard to the **title**,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the **abstract**,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box III. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. The figure of the **drawings** to be published with the abstract is Figure No.



as suggested by the applicant.



because the applicant failed to suggest a figure.



because this figure better characterizes the invention.

2



None of the figures.

INTERNATIONAL SEARCH REPORT

International Application No.

P 00/00526

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 B01J9/18

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B01J

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|---|-----------------------|
| X | GB 328 410 A (ERNST BUHTZ) 1 May 1930 (1930-05-01) the whole document --- | 1,2,8,16 |
| X | GB 1 080 863 A (UNILEVER LIMITED) 23 August 1967 (1967-08-23) page 3, line 62 -page 4, line 27 claims 1-25; figure 1 --- | 1-3,8,16 |
| A | US 4 311 570 A (COWEN GEOFFREY, NORTON-BERRY PHILIP, STEEL MARGARET L) 19 January 1982 (1982-01-19) column 12, line 55 -column 13, line 7 claims 1-9; figure 4 --- | 9-11,19 |
| X | US 4 311 570 A (COWEN GEOFFREY, NORTON-BERRY PHILIP, STEEL MARGARET L) 19 January 1982 (1982-01-19) column 12, line 55 -column 13, line 7 claims 1-9; figure 4 --- | 1,3,8,18 |
| | --- | |

---/---

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"8" document member of the same patent family

Date of the actual completion of the international search

22 June 2000

Date of mailing of the international search report

30/06/2000

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-3040, Tx. 31 651 epo nl,
Fax: (+31-70) 340-3016

Authorized officer

Vlassis, M

INTERNATIONAL SEARCH REPORT

International Application No.

PCT/GB 00/00526

C. (Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|------------|--|-----------------------|
| X | US 4 343 750 A (HOLIDAY PAUL R, PATTERSON ROBERT J.) 10 August 1982 (1982-08-10) column 2, line 12 -column 3, line 34 claims 1-10; figure 1 --- | 1, 3, 8, 16 |
| A | GB 2 108 407 A (LEUNA WERKE VEB) 18 May 1983 (1983-05-18) the whole document --- | 1, 3, 16 |
| A | GB 1 600 708 A (PLANER LTD G V) 21 October 1981 (1981-10-21) claims 1-20; figures 1-3 ----- | 1, 3, 8, 15, 18 |

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/GB 00/00526

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|--|------------------|-------------------------|------------------|
| GB 328410 | A | NONE | |
| GB 1080863 | A | NONE | |
| US 4311570 | A | 19-01-1982 | |
| | | AU 530811 B | 28-07-1983 |
| | | AU 4446879 A | 30-08-1979 |
| | | AU 4446979 A | 30-08-1979 |
| | | CA 1125994 A | 22-06-1982 |
| | | DE 2965174 D | 19-05-1983 |
| | | DE 2967553 D | 23-01-1986 |
| | | EP 0003906 A | 05-09-1979 |
| | | EP 0003907 A | 05-09-1979 |
| | | EP 0056001 A | 14-07-1982 |
| | | IT 1111205 B | 13-01-1986 |
| | | IT 1111204 B | 13-01-1986 |
| | | JP 1437023 C | 25-04-1988 |
| | | JP 54126675 A | 02-10-1979 |
| | | JP 62043735 B | 16-09-1987 |
| | | JP 54126676 A | 02-10-1979 |
| | | NZ 189726 A | 29-05-1981 |
| | | NZ 189727 A | 29-05-1981 |
| US 4343750 | A | 10-08-1982 | |
| | | AR 211948 A | 14-04-1978 |
| | | AU 504524 A | 18-10-1979 |
| | | AU 2146977 A | 27-07-1978 |
| | | BE 850867 A | 16-05-1977 |
| | | BR 7700607 A | 18-10-1977 |
| | | CA 1093771 A | 20-01-1981 |
| | | CH 613391 A | 28-09-1979 |
| | | DE 2703169 A | 11-08-1977 |
| | | DK 35877 A,B, | 31-07-1977 |
| | | ES 455472 A | 01-01-1978 |
| | | FR 2339458 A | 26-08-1977 |
| | | GB 1547084 A | 06-06-1979 |
| | | IL 51305 A | 30-09-1982 |
| | | IT 1077877 B | 04-05-1985 |
| | | JP 1305672 C | 13-03-1986 |
| | | JP 52107259 A | 08-09-1977 |
| | | JP 60025481 B | 18-06-1985 |
| | | NL 7700776 A | 02-08-1977 |
| | | NO 770267 A,B, | 02-08-1977 |
| | | SE 419705 B | 24-08-1981 |
| | | SE 7700697 A | 31-07-1977 |
| | | US 4078873 A | 14-03-1978 |
| | | ZA 7700321 A | 30-11-1977 |
| GB 2108407 | A | 18-05-1983 | |
| | | DD 207103 A | 15-02-1984 |
| | | DD 207104 A | 15-02-1984 |
| | | BG 44125 A | 14-10-1988 |
| | | CS 8207137 A | 15-05-1985 |
| | | DE 3235669 A | 05-05-1983 |
| | | BG 41732 A | 14-08-1987 |
| | | CS 8207138 A | 15-05-1985 |
| GB 1600708 | A | 21-10-1981 | NONE |

P/ INT COOPERATION TREA

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

From the INTERNATIONAL BUREAU

To:

Assistant Commissioner for Patents
 United States Patent and Trademark
 Office
 Box PCT
 Washington, D.C.20231
 ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

| | |
|---|---|
| Date of mailing (day/month/year) 18 October 2000 (18.10.00) | |
| International application No. PCT/GB00/00526 | Applicant's or agent's file reference CTV/P45134WO |
| International filing date (day/month/year) 17 February 2000 (17.02.00) | Priority date (day/month/year) 17 February 1999 (17.02.99) |
| Applicant RAMSHAW, Colin et al | |

1. The designated Office is hereby notified of its election made:

☒ in the demand filed with the International Preliminary Examining Authority on:
 15 September 2000 (15.09.00)

☐ in a notice effecting later election filed with the International Bureau on:

2. The election ☒ was
☐ was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

| | |
|---|--|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35 | Authorized officer Zakaria EL KHODARY Telephone No.: (41-22) 338.83.38 |
|---|--|

09/93905

Copy for the Elected Office (EO/US)

PCT/GB00/00526

PATENT COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING OF A CHANGE

(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

HARRISON GODDARD FOOTE
Tower House
Merrion Way
Leeds LS2 8PA
ROYAUME-UNI

| | |
|---|-------------------------------|
| Date of mailing (day/month/year) 23 August 2001 (23.08.01) | |
| Applicant's or agent's file reference CTV/P45134WO | IMPORTANT NOTIFICATION |
| International application No. PCT/GB00/00526 | |
| International filing date (day/month/year) 17 February 2000 (17.02.00) | |

1. The following indications appeared on record concerning:

☒ the applicant ☐ the inventor ☐ the agent ☐ the common representative

| | | |
|---|----------------------------|--------------------------|
| Name and Address NEWCASTLE UNIVERSITY VENTURES LIMITED Sun Alliance House 35 Mosley Street Newcastle upon Tyne NE1 1XX United Kingdom | State of Nationality GB | State of Residence GB |
| | Telephone No. | |
| | Facsimile No. | |
| | Teleprinter No. | |

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person ☒ the name ☒ the address ☐ the nationality ☐ the residence

| | | |
|---|----------------------------|--------------------------|
| Name and Address PROTENSIVE LIMITED 35 Hills Road Cambridge, CB2 1NT United Kingdom | State of Nationality GB | State of Residence GB |
| | Telephone No. | |
| | Facsimile No. | |
| | Teleprinter No. | |

3. Further observations, if necessary:

4. A copy of this notification has been sent to:

☒ the receiving Office ☐ the designated Offices concerned
☐ the International Searching Authority ☒ the elected Offices concerned
☐ the International Preliminary Examining Authority ☐ other:

| | |
|---|--|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland Facsimile No.: (41-22) 740.14.35 | Authorized officer Dominique DELMAS Telephone No.: (41-22) 338.83.38 |
|---|--|

PCT INTERNATIONAL COOPERATION TREATY

PCT

NOTIFICATION OF THE RECORDING
OF A CHANGE(PCT Rule 92bis.1 and
Administrative Instructions, Section 422)

From the INTERNATIONAL BUREAU

To:

HARRISON GODDARD FOOTE
Tower House
Merrion Way
Leeds LS2 8PA
ROYAUME-UNI

| | |
|---|---|
| Date of mailing (day/month/year) 01 December 2000 (01.12.00) | IMPORTANT NOTIFICATION |
| Applicant's or agent's file reference CTV/P45134WO | |
| International application No. PCT/GB00/00526 | International filing date (day/month/year) 17 February 2000 (17.02.00) |

1. The following indications appeared on record concerning:

☒ the applicant
 ☐ the inventor
 ☐ the agent
 ☐ the common representative

| | | |
|--|----------------------------|--------------------------|
| Name and Address UNIVERSITY OF NEWCASTLE 6 Kensington Terrace Newcastle upon Tyne NE1 7RU United Kingdom | State of Nationality GB | State of Residence GB |
| | Telephone No. | |
| | Facsimile No. | |
| | Teleprinter No. | |

2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning:

☒ the person
 ☒ the name
 ☒ the address
 ☐ the nationality
 ☐ the residence

| | | |
|---|----------------------------|--------------------------|
| Name and Address NEWCASTLE UNIVERSITY VENTURES LIMITED Sun Alliance House 35 Mosley Street Newcastle upon Tyne NE1 1XX United Kingdom | State of Nationality GB | State of Residence GB |
| | Telephone No. | |
| | Facsimile No. | |
| | Teleprinter No. | |

3. Further observations, if necessary:

The person in box 1 has assigned his rights to the person in box 2.

4. A copy of this notification has been sent to:

| | |
|---|---|
| <input checked="" type="checkbox"/> the receiving Office | <input type="checkbox"/> the designated Offices concerned |
| <input type="checkbox"/> the International Searching Authority | <input checked="" type="checkbox"/> the elected Offices concerned |
| <input checked="" type="checkbox"/> the International Preliminary Examining Authority | <input type="checkbox"/> other: |


| | |
|---|--|
| The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland | Authorized officer Christine Carrié |
| Facsimile No.: (41-22) 740.14.35 | Telephone No.: (41-22) 338.83.38 |

PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

| | | | |
|--|--|---|---|
| Applicant's or agent's file reference CTV/P45134WO | | FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416) | |
| International application No. PCT/GB00/00526 | | International filing date (day/month/year) 17/02/2000 | Priority date (day/month/year) 17/02/1999 |
| International Patent Classification (IPC) or national classification and IPC B01J19/18 | | | |
| Applicant NEWCASTLE UNIVERSITY VENTURES LIMITED et al. | | | |
| <p>1. This international preliminary examination report has been prepared by this international Preliminary Examining Authority and is transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 4 sheets, including this cover sheet.</p> <p><input checked="" type="checkbox"/> This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).</p> <p>These annexes consist of a total of 21 sheets.</p> | | | |
| <p>3. This report contains indications relating to the following items:</p> <ul style="list-style-type: none"> I <input checked="" type="checkbox"/> Basis of the report II <input type="checkbox"/> Priority III <input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability IV <input type="checkbox"/> Lack of unity of invention V <input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement VI <input type="checkbox"/> Certain documents cited VII <input type="checkbox"/> Certain defects in the international application VIII <input type="checkbox"/> Certain observations on the international application | | | |
| Date of submission of the demand 15/09/2000 | | Date of completion of this report 08.05.2001 | |
| Name and mailing address of the international preliminary examining authority:  European Patent Office D-80288 Munich Tel. +49 89 2399 - 0 Tlx 523656 epmu d Fax +49 89 2399 - 4485 | | Authorized officer Buesing, G Telephone No. +49 89 2399-8356 | |

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

and receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17):

Description, pages:

1-19 as received on 23/03/2001 with letter of 21/03/2001

Claims, No.:

1-11 as received on 23/03/2001 with letter of 21/03/2001

Drawings, sheets:

1/4-4/4 as originally filed

2. With regard to the language, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any nucleotide and/or amino acid sequence disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

**INTERNATIONAL PRELIMINARY
EXAMINATION REPORT**International application No. **PCT/GB00/00526**☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

| | | |
|-------------------------------|------|---------------|
| Novelty (N) | Yes: | Claims 1 - 11 |
| | No: | Claims |
| Inventive step (IS) | Yes: | Claims 1 - 11 |
| | No: | Claims |
| Industrial applicability (IA) | Yes: | Claims 1 - 11 |
| | No: | Claims |

- 2. Citations and explanations**
see separate sheet

INTERNATIONAL PRELIMINARY

International application No. PCT/GB00/00526

EXAMINATION REPORT - SEPARATE SHEET**Section V:**

1. The invention relates to a spinning wheel reactor the temperature of which is controlled by a heat transfer fluid. In particular, in the reactor according to claim 1 a subdivided space is foreseen for the heat transfer medium, which is axially supplied and withdrawn, and the space adjacent to the spinning wheel comprises a membrane or plate. In the reactor according to independent claim 9, both reactant and heat transfer medium are withdrawn from the outer perimeter of the spinning wheel, and the spaces for the reactant and the heat transfer medium are separated from each other by an annular baffle which fits into a groove of the support element. According to the independent claim 10, the heat transfer fluid is formed on the second surface as a thin film which is obtained by the provision of an undercut trough for the heat transfer fluid supply.
2. The closest prior art document is GB-A-1080863 which discloses a spinning wheel reactor with a construction on the reactant side which is similar to the construction of the heat exchange side of claim 1. However, it would not be obvious for the ordinarily skilled worker to modify the prior art reactor as now claimed. Whereas the prior art reactor is designed to improve mass transfer on the reactant side, the invention aims at an improved heat exchange. Due to the different underlying problems, the skilled worker would not get an incentive to modify the known reactor. Consequently, the subject-matter of claim 1 is both novel and inventive.

The prior art is silent to the essential features of the reactor as defined in independent claim 9. The skilled worker would have no incentive to construct such a reactor which results in a simple construction for a temperature-controlled spinning wheel reactor. Claim 9 is therefore considered as novel and inventive.

Claim 10 is also inventive because the reactor defined therein comprises an undercut trough as feed supply for the heat transfer medium. There is no prior art document available which discloses such a construction which ensures improved supply and control of the heat transfer medium.

3. In view of the inventive step acknowledged for the independent claims, the dependent claims are also considered as relating to inventive subject-matter.